

from above; the pulmonary chamber has been turned to the left and the generative organs to the right. *a*, foot; *b*, pulmonary vessels; *c*, spire; *d*, rectum; *e*, kidney; *f*, albuminiparous gland; *g*, anterior pedal artery; *h*, multifid vesicles; *i*, penis; *j*, aorta just where it perforates the peritoneal covering of the viscera (the pericardium has not been laid open, so the heart is not seen); *k*, branch to stomach and contents of spire; *l*, branch to the side of the body; *m*, branch to posterior portion of the foot; *n*, branch to salivary glands and crop; *o*, branch to tentacles, penis, and parts about the head; *p*, point where the aorta perforates the infra-oesophageal mass and bends back to enter the foot (part of the ganglion has been cut away); *q*, branch to generative ducts.

*Fig. 2.* The pulmonary chamber, heart, kidney, and venous sinus of the same: *a*, heart; *b*, pulmonary vein; *c*, venous sinus; *d*, narrow portion of pulmonary chamber between the rectum and kidney; *e*, kidney, which has been laid open; its duct runs along the inner surface of the rectum, and terminates close by the pulmonary orifice; *f*, rectum.

II.—On Pauropus, a New Type of Centipede. By Sir JOHN LUBBOCK, Bart., V.P. Linn. Soc., Pres. Ent. Soc., V.P. Ethn. Soc., F.R.S., &c.\*

THE subject of the following communication is a small, white, bustling, intelligent, little creature, about  $\frac{1}{25}$  of an inch in length, and may be characterized as follows:—

Body composed of ten segments, including the head, convex, with scattered hairs. Nine pairs of legs. Antennæ 5-jointed, bifid at the extremity, and bearing three, long, jointed appendages.

The author has met with this little Centipede in some numbers, among Thysanura, &c., in his kitchen-garden. He was at first disposed to regard it as a larva; but having, during the last three months, had several hundred specimens under examination without finding any in a more advanced condition, and having found spermatozoa in several, he thought there could be no doubt that it is a mature form.

The body is rather narrower in front. The head consists of two segments; the third segment bears one pair of legs; the fourth, fifth, sixth, and seventh two pairs each. Strictly speaking, however, each of these segments is double. The posterior legs are the longest. Each segment, from the third to the seventh, has on the side a pair of strong bristles. There are also several transverse rows of short club-shaped hairs. The eyes are large and oval. The antennæ are very remarkable, and quite unlike those of any other Myriapods. They are 5-jointed and bifid at the extremity. The first four segments are short. The two branches constituting the fifth are longer and

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unequal. One bears a single, the other two, long, many-jointed appendages. The mouth consists of two pairs of minute organs; the anterior ones toothed, the posterior pointed. Between the second pair of legs are two processes, which probably form part of the generative organs.

The author has been able to trace the development. The smallest specimens met with have three pairs of legs, and the number increases at each moult; but it is remarkable that whereas two pairs are acquired in the first, so that the number rises from three pairs to five, at the subsequent moults a single additional pair only is obtained.

A second species of the genus was found with the first. It is, however, much rarer, and differs in the form of the antennæ.

Sir John then proceeded to make some remarks on the systematic position of the Myriapoda, which he regarded as forming a class, and he expressed the opinion that the genus now described approached the other Articulata more nearly than any Myriapod hitherto known. Nor did he think that *Pauropus* could be placed in either of the two great groups of Myriapoda, which may be characterized as follows:—

**CHILOPODA.** Antennæ with not *fewer* than fourteen segments. One pair modified into powerful footjaws. Generative organs opening at the posterior end of the body. Legs in single pairs.

**DIPLOPODA.** Antennæ with not *more* than seven segments. No footjaws. Generative organs opening at the anterior part of the body. Legs, after the first six, arranged in double pairs.

*Pauropus*, at first sight, looks most like a Chilopod. Its activity, the compactness of its body, the dorsal plate, and elongated hind legs give it much the appearance of a very minute *Lithobius*. A closer examination, however, does not favour this view. The antennæ have only five segments; the powerful footjaws are absent; and the generative organs appear to open anteriorly.

Nor can *Pauropus* be classed among the Diplopods. It is true that the eight posterior legs correspond to four dorsal plates; nevertheless it is evident that in reality each pair belongs to a separate segment, as may clearly be seen if we look at the animal from beneath. In one sense, this is true also of the Diplopods; but they invariably have the legs attached by double pairs, while those of *Pauropus* are equidistant. Moreover in all Diplopods the first three pairs of legs are distinguished from the rest by possessing each a distinct segment, whereas in *Pauropus* this is the case with the first pair only. In Di-

plopods, again, the legs are equal, and terminate in a simple claw, which is not the case in *Pauropus*. The mouth-parts, though very different from those of the Chilopods, are perhaps even less like those of the Diplopods. The eyes and antennæ are also very different.

Thus, then, *Pauropus* differs greatly from either of the two great orders of Centipedes. It forms a connecting link not only between the Myriapods and other Articulata, but also between the Chilopoda and Diplopoda.

III.—On the Sap-currents (Rotation and Circulation in the Cells of Plants), with reference to the question of Contractility. By Professor REICHERT\*.

THE results of my investigations may be summed up in the following paragraphs:—

1. In all vegetable cells with rotating, circulating, or rotato-circulating currents, two parts are to be distinguished in the contents of the cellulose capsule—namely, the central “cell-juice” or “cell-fluid” situated in the axis, and the “mantle-layer” (*Mantelschicht*) diffused between this and the cellulose capsule.

2. The “cell-fluid” is colourless, or coloured as in *Tradescantia virginica*, not very tenaciously fluid, and without albumen, but not well known as regards its other chemical properties; with respect to the circulation, it is the motionless, resting part of the cell-contents.

3. To the “mantle-layer” belong the following constituents:—the “mantle-fluid” as I have called it, the tenaciously fluid substance named “protoplasm” by Hugo Mohl; chlorophyll corpuscles, and other very small solid corpuscles, the chemical nature of which cannot be ascertained positively; the cell-nucleus; microscopic crystals; and the primordial utricle when this is present, which would form the boundary of the “mantle-layer” towards the cellulose capsule.

4. In the Characeæ the “mantle-fluid” cannot be overlooked; it was, however, erroneously assimilated to the tenacious fluid substance of circulating sap-currents, the so-called protoplasm-currents, and rightly distinguished only by Nägeli. In the cells with circulating sap-currents, it was first detected by E. Brücke in the stinging-hairs of *Urtica urens*; and it was observed in all the cells with rotating or circulating sap-currents examined by me. It is diffused between the cell-juice and the cellulose capsule, or the primordial utricle when this is present, is fluid, rich

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